MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2015/2016

PTM0145 – TRIGONOMETRY

(Foundation in Information Technology / Life Sciences)

8 October 2015
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **TWO** pages excluding the cover page and the Appendix.

2. Answer **FOUR** out of **FIVE** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

4. All necessary working steps **MUST** be shown.

Instruction: Answer **FOUR** out of **FIVE** questions.

Question 1 [25 marks]

a. Given $z=-4+7i$ and $w=5-2i$.

i. Find the standard form of $\frac{w}{z}$ and $(wz)^2$ (11 marks)

ii. Find the polar form of z and w. (9 marks)

b. Solve the equation in the complex number system: $4x^2-7x+5=0$. (5 marks)

Question 2 [25 marks]

a. Find an equation of the straight line that passes through the center of the circle $x^2+y^2+14x-24y+184=0$ and is parallel to the line $y=4x-5$. (10 marks)

b. Find the vertex, focus, directrix, and axis of symmetry of the parabola $x^2-4x-20y-36=0$. Hence, sketch the parabola. Show clearly the vertex, focus, directrix and axis of symmetry. (15 marks)

Question 3 [25 marks]

a. Given $A=\begin{bmatrix} 6 & -5 & -1 \\ 4 & 0 & 9 \\ -2 & 3 & 1 \end{bmatrix}$, $B=\begin{bmatrix} 2 & -2 & 5 \\ 4 & 1 & -3 \end{bmatrix}$ and $C=\begin{bmatrix} 0 & 3 & 7 \\ -6 & 1 & 3 \\ 10 & -8 & 2 \end{bmatrix}$.

Find

i. $3A+C^T$ (6 marks)

ii. BC (4 marks)

b. Solve the given system of linear equation by using the inverse method.

$$2x+6y+z=5$$
$$x+3y-z=-8$$
$$3x+2z=8$$

(15 marks)

Continued...

Question 4 [25 marks]

a. Given $y = -5\cos(4x - \pi)$ for $0 \le x \le \pi$.

i. Determine the amplitude, period and phase shift. (4 marks)

ii. Find the y-intercept and x-intercepts, and sketch the graph of $y = -5\cos(4x - \pi)$ for $0 \le x \le \pi$. (9 marks)

b. Solve the triangle ABC given that lengths AB = 12cm, BC = 17cm, and $\angle ACB = 40°$. (12 marks)

Question 5 [25 marks]

a. Given $\sin\alpha = -\frac{3\sqrt{34}}{34}$, $\frac{3\pi}{2} < \alpha < 2\pi$ and $\tan\beta = \frac{5}{6}$, $\pi < \beta < \frac{3\pi}{2}$.

Find the exact value of

i. $\cos(\alpha - \beta)$. (9 marks)

ii. $\sin 2\alpha - \cos 2\beta$. (5 marks)

b. Solve the equation $6\tan^2 2x + 5\tan 2x - 4 = 0$ for $0° \le x \le 360°$. (11 marks)

End of Page

APPENDIX

Trigonometry Identities

$$\cos^2 A + \sin^2 A = 1 \qquad \sec^2 A = 1 + \tan^2 A \qquad \csc^2 A = 1 + \cot^2 A$$

$$\cos(A+B) = \cos A \cos B - \sin A \sin B$$
$$\cos(A-B) = \cos A \cos B + \sin A \sin B$$
$$\sin(A+B) = \sin A \cos B + \cos A \sin B$$
$$\sin(A-B) = \sin A \cos B - \cos A \sin B$$
$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$
$$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

$$\cos 2A = \cos^2 A - \sin^2 A$$
$$= 2\cos^2 A - 1 = 1 - 2\sin^2 A$$
$$\sin 2A = 2 \sin A \cos A$$

$$\tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

$$\sin A \cos B = \frac{1}{2}[\sin(A+B) + \sin(A-B)]$$
$$\cos A \cos B = \frac{1}{2}[\cos(A+B) + \cos(A-B)]$$
$$\sin A \sin B = \frac{1}{2}[\cos(A-B) - \cos(A+B)]$$

$$\sin A + \sin B = 2 \sin \frac{A+B}{2} \cos \frac{A-B}{2} \qquad \sin A - \sin B = 2 \cos \frac{A+B}{2} \sin \frac{A-B}{2}$$

$$\cos A + \cos B = 2 \cos \frac{A+B}{2} \cos \frac{A-B}{2} \qquad \cos A - \cos B = -2 \sin \frac{A+B}{2} \sin \frac{A-B}{2}$$

$$\sin^2 \frac{A}{2} = \frac{1 - \cos A}{2} \qquad \cos^2 \frac{A}{2} = \frac{1 + \cos A}{2} \qquad \tan^2 \frac{A}{2} = \frac{1 - \cos A}{1 + \cos A}$$

$$\sin \frac{A}{2} = \pm \sqrt{\frac{1 - \cos A}{2}} \qquad \cos \frac{A}{2} = \pm \sqrt{\frac{1 + \cos A}{2}} \qquad \tan \frac{A}{2} = \pm \sqrt{\frac{1 - \cos A}{1 + \cos A}}$$

$$\tan \frac{A}{2} = \frac{1 - \cos A}{\sin A} = \frac{\sin A}{1 + \cos A}$$